TRANSACTIONS OF THE SECTION ON GENERAL SURGERY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Stated Meeting, May 10, 1895.

DR. O. H. ALLIS in the Chair.

STERILIZATION OF CATGUT BY BICHLORIDE OF PALLADIUM AND BICHLORIDE OF MERCURY.

DR. W. W. KEEN described a method of preparing catgut which had now been in use in the Jefferson Medical College Hospital for over two years, with such excellent results that he ventured to publish it so that others might test it. He stated that Professor Coplin, Dr. Bevan, and Dr. D. Braden Kyle had tested the catgut several times at his request and had found it perfectly sterile. He had made no experiments to determine its absorbability, but inasmuch as its clinical use in, perhaps, 300 or 400 cases had not shown any disaster due to non-absorption, it had seemed to him superfluous to make any such experiments upon animals.

He disclaimed for himself any part in originating it. It had been entirely the work of John Johnson, a helper in the clinic.

The method of preparation is as follows:

The catgut that is used is the *raw* catgut, not that prepared by boiling or heating, as is the case with much of that furnished by instrument-makers. The gut is first soaked in Squibb's ether (not the common commercial ether, which has sulphuric acid in it) for from twenty-four to forty-eight hours, according to thickness, in order to remove the fat. It is then placed in a solution of

Bichloride of mercury	20 grs.
Tartaric acid	100 grs.
Alcohol (95 per cent.)	6 ozs.

The catgut is soaked in this bichloride of mercury solution, according to its thickness, for a greater or less length of time. Dividing it roughly into three grades,—1, 2, and 3; 1 being the finest, 3 the thickest, and 2 that of intermediate thickness. No. 1 is soaked from five to ten minutes in the bichloride solution; No. 2, fifteen to twenty minutes; No. 3, twenty-five to thirty minutes. The bottles intended to contain the catgut are then made aseptic, both within and without, by washing in a $\frac{1}{1000}$ sublimate solution, and are then filled with 95 per cent. alcohol, to which is added two drops (about one-twenty-fourth of a grain) of the bichloride of palladium solution to the pint of alcohol. More than this small proportion of palladium precipitates. It is then kept permanently in these bottles.

Dr. D. Braden Kyle had tested the strength of this palladium catgut as contrasted with some tests of other catgut he made three years ago,[1] and had found that it was much stronger than the catgut prepared without the palladium. The finest can only be broken by a force greater than would ordinarily be used in tying small arteries, and the thickest can scarcely be broken by the utmost strength of the hands.

He had found it flexible, strong, and aseptic, the three most desirable qualities in catgut for surgical use. Any unused ligatures left at an operation are soaked in the mercurial solution again for three to five minutes and replaced in the palladium solution.

The bichloride of palladium solution can be obtained from a reliable firm of manufacturing chemists in Philadelphia.

ILIAC AND FEMORAL ANEURISMS.

Dr. Thomas S. K. Morton exhibited a case of iliac and femoral aneurism cured by transperitoneal ligation of the external iliac artery, and also a case of popliteal aneurism cured by ligation of the femoral artery.

Dr. Joseph Ransohoff, of Cincinnati, remarked that in all aneurisms, after any operation, about 10 per cent. of the cases will recur; and they are more apt to recur where the ligature is applied to the continuity of the artery, especially where digital compression has been previously resorted to for any length of time, which increases the vascularity of the sac. Cases have been reported of popliteal aneurism in which, after five, six, or even fifteen years after the femoral was tied, pulsation in the tumor was resumed. He himself had had a case of cure of popliteal aneurism by ligation of the femoral artery, in which there is still a tumor in the popliteal space, and there may yet be a recurrence. Dr. Morton's second case is not unfavorably situated for the radical operation of removal of the sac. Possibly, it could be done now with less danger than two months before, at the time when the first operation was done. Of course, the radical operation seems more dangerous than the operation by simple ligation, on account of the dissection required to separate the sac from its adhesions to neighboring blood-vessels and nerves. But the difficulty is more apparent than real. If the surgeon is operating upon the axillary artery and clears out the tumor from the axilla, he may fear gangrene of the extremity; but no such result had followed this procedure in his experience. Also in cases affecting the popliteal artery, where both the artery and the vein have been tied in the operation, this result has not followed. In the course of the contraction of an aneurismal sac, some fibres of nerves may become involved, producing symptoms which may require amputation of the limb. This result will not follow total extirpation of the aneurismal sac.

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[1] Therapeutic Gazette, May, 1892.

Dr. John B. Roberts said that he had advocated the radical operation of extirpation of the aneurismal sac, although he had not himself done the operation of extirpation.

With regard to the first case presented by Dr. Morton he thought that the tying of the external iliac artery by the transperitoneal method to be much better than the old operation, by which one works in the dark, being guided only by the finger. He thought that the extirpation of the sac would be too radical for the cases which Dr. Morton had shown. The second case was to all intents and purposes cured. He may have a little dilatation hereafter, but he doubted if it would be a dilatation of the popliteal artery at the old spot. All know that, if the vessel is tied above the aneurism, any dilatation afterwards must be in the upper portion of the vessel, or somewhere in the neighborhood, and not, as one would be led to believe from Dr. Ransohoff's criticism, that there is a recurrence of dilatation in the old sac.

He operated a few years ago upon a man for popliteal aneurism, which was rapidly growing. He was cured of this, but returned a few years later with an axillary aneurism, from which he died. He saw also a case of Dr. Hearn's, in which there was an aneurism of the neck followed by others in different portions of the body.

Dr. W. W. Keen remarked that he had the pleasure of assisting Dr. Morton when he did the transperitoneal operation of ligation of the external iliac artery, and he could state that there was a great deal of sac at the time. Partly on account of the position of the vessel, and partly because the patient was in bed, the operation was done in the Trendelenburg position.

As regards the method of operating, he himself was in favor of ligation. In the second case, however, he was inclined to think it might be possible to adopt extirpation. It is a good operation, but there are cases in which he would hesitate very much about doing it as in the first case, where the sac extended into the pelvis and the operation might require division of Poupart's ligament. In such cases he would prefer the operation done by Dr. Morton.

Dr. J. M. Barton mentioned a case of ligation of the femoral artery for popliteal aneurism, which he did some years before at the German Hospital. It was in a man, and of traumatic origin. He returned two years later, with a continued fever, and was admitted into the medical wards as a case of typhoid fever. After a few days he was transferred to the surgical ward and again operated upon. This was five years ago, when the operation of excision was a novelty; but Dr. Barton started to do it in this case and found it a formidable operation, for the sac went beneath the ligament, and there were many adhesions to the vein. The patient made a good recovery and returned to his work at hard labor. He reports now that his leg gets tired when he stands for a time upon it; but he is well satisfied with the result. It depends very much upon the character of the case, of course, whether ligation or excision is the better operation to perform.

CONSERVATIVE KIDNEY SURGERY.[1]

Dr. C. Fenger, of Chicago, called attention to the subject of the conservative surgery of the kidney as compared with nephrectomy.

Conservative surgery he thought to be useful and probably had a future in hydronephrosis. If it is possible to remedy the stenosis which causes this condition, it should be done, even in large sacs, in preference to extirpation. In 1885, the statistics of nephrectomy for hydronephrosis, according to DeJong, who collected fifteen cases with twenty-six operations, showed nine recoveries, five deaths, and one in which the result was unknown,—a mortality of 35.7 per cent.

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[1] Delivered by invitation before the Surgical Section of the College of Physicians of Philadelphia at a stated meeting held May 10, 1895.

This high death-rate was probably because the hydronephrosis forms a retroperitoneal tumor, and because the mortality following extirpation is affected by the size and location of the tumor, the larger the tumor the greater the risk, and the greater the difficulty in loosening the hydronephrotic sac from the many important organs in the retroperitoneal space. A large hydronephrotic sac, occupying one-half or more of the peritoneal cavity, has often been mistaken for an ovarian cyst. In thirteen such cases, cited by DeJong, extirpation through the abdomen was practised, often with almost insurmountable difficulties in operating. Smaller hydronephroses have been extirpated by the lumbar method in three cases with two recoveries and one death; but the size of most hydronephroses makes extirpation by the lumbar method impossible.

In August, 1894, Dr. Fenger opened a hydronephrotic sac from the lumbar region, which was so large that he could not reach either the upper or the lower end, and could not find the entrance to the ureter in the sac. After drainage for three months, the sac had so diminished in size that he was enabled, by a second operation, to find the ureter below, and to follow it up to the place of valve-formation at the entrance to the sac. The ureter was reopened by the operation for valve-formation, as described in my former article, and the lumbar wound closed without fistula in less than six weeks.

It thus seems advisable, especially in cases where an appreciable amount of secreting kidney tissue still exists in the hydronephrotic sac, to make lumbar drainage, and when the ureter cannot be found at this time, on account of the size of the hydronephrosis, to wait until the sac is so reduced in size as to permit the ureter to be found below and its patency re-established. By this procedure whatever secreting tissue remains is saved, and each of the conservative operations is less severe than nephrectomy,—that is, extirpation of the hydronephrotic sac.

There is another form of dilated kidney in which conservative operations are indicated as compared with nephrectomy. These are the cases of sacculated, suppurating kidney. In these cases there is only a moderate degree of dilatation; each of the many calyces is transformed into a sac which often has a narrow entrance, and in the partition walls between the sacs a variable amount of kidney tissue exists. The obstruction which causes the dilatation may be in the ureter or may, on the other hand, be in the kidney itself. In the latter case an entirely different method of operating is required, which I term "operation for stenosis in sacculated kidney."

The stenosis in the kidney may arise from a valvular arrangement of the partition walls between the sacs of the dilated calyces, such as the speaker described in 1873 in a paper entitled "Om den partielle Hydronefrose, oplyst ved et Sygdomstilfalde" (*Nordiskt Medicinskt Arkiv*, Bd. v, No. 12), in which he reported a case in which a partial hydronephrosis had formed in the upper half of the kidney above a valve of this kind. The requirement for this condition is an incomplete stenosis somewhere in the course of the ureter, which causes a moderate degree of multiple sac-formation over the whole kidney. At some point between a group of sacs and the dilated pelvis a valve now forms by reason of the excessive projection of one of the partition walls. This valve entirely closes off the distant group of sacs, and causes either local hydronephrosis and progressive dilatation of the excluded group, or, at any rate, renders the discharge of the contents from this group down into the pelvis impossible. It is consequently not sufficient to overcome the stenosis of the ureter alone, but it is necessary also to do away with the occlusion in the kidney itself.

He mentioned a case illustrative of this condition, and of the operation required for its relief. A young man with purulent cystitis, pyelitis, and dilatation of the kidney was operated upon in Philadelphia, in March, 1894, by drainage in the lumbar region, which left a fistula which discharged twenty-five to thirty ounces of urine in the twenty-four hours. Six months later Dr. Fenger operated with a view of making the ureter patent. He found a stenosis of the ureter at the entrance to the pelvis, made the usual plastic operation, and expected the fistula to close; but this did not take place, and the same amount of urine as before was discharged through the lumbar opening. Seven months later, expecting to find the ureter again closed at the seat of the former operation, or an independent obstruction in the kidney, he made a second operation with a view of overcoming the latter. After exposing the kidney, he divided it from the convex surface down into the pelvis into two halves. The partition walls between the numerous sacs were all separately divided so as to make the sacculated kidney one single cavity freely communicating with the pelvis. When he finally exposed the lowest portion of the pelvis, he found the ureter perfectly patent at the seat of the former operation. It was thus seen that obstruction caused by valve-formation between the sacs must have been the reason for the continuous discharge from the renal fistula. Four months later the bisected kidney was closed by suture, and at present the renal fistula has closed.

At the first glance it might appear that it would have been a much easier or shorter way out of the difficulties in this case to have extirpated the kidney; but this certainly would have caused the death of the patient, for between the first and second operations he had an attack of pyelitis in the other kidney, which placed the alternative of nephrectomy out of the question, and left no other course open except to save the kidney by re-establishing its connection with the bladder, if possible. If no pyelitis had been seen to exist, however, in the other kidney, the question of the permissibility of extirpating a kidney with a secreting capacity of thirty ounces in the twenty-four hours would be one for serious consideration.

A third instance, which demonstrates the value of conservative operating, he encountered in a case of tuberculosis of the kidney and stricture of the ureter in a man with hæmaturia, tubercle bacilli in the urine, and painful enlargement of the right kidney. He intended to perform nephrotomy or nephrectomy as the case might be, but found upon exposing the kidney that the tuberculosis was limited to the lower third of the kidney, which he resected, as the upper two-thirds of the kidney appeared healthy. He found the pelvis and ureter dilated, and at the vesical end of the latter a stricture which would not permit a sound to be passed down into the bladder. Sixteen to twenty ounces of urine passed daily through the lumbar fistula. The patient improved so much that, six weeks later, he operated upon the ureteral stricture by a suprapubic cystotomy and re-established the patency of the ureter. Two months later almost all the urine passed down into the bladder; but several months after the stricture of the ureter again retracted and urine was discharged through the lumbar fistula.

In case of tuberculosis, taking into consideration the uncertainty of the condition of the other kidney, it would probably be fatal to extirpate a kidney secreting as much urine as its fellow.

THE CLICK OF POLISHED BONE SURFACES AS AN AID IN THE DIAGNOSIS OF OSTEO-TUBERCULOSIS OF JOINTS WITH LARGE SEQUESTRA.

Dr. Fenger said that since the introduction of the iodoform emulsion injection by Von Bruns in the treatment of tuberculous abscesses and tuberculosis of joints, excisions of joints have fortunately become comparatively rare. The marvellous effect of the iodoform emulsion to bring the tuberculosis to an end has not only saved many lives by the avoidance of the secondary infection which so often follows excision, but has also saved all the bone remaining in the tuberculous joint, and has thus given functional results far superior to those following excision. In consequence of this, it is only the severest cases of articular osteo-tuberculosis which do not respond to the iodoform emulsion injection, and in which resection finally becomes the operation of last resort. In the hip-joint, especially in adults, the prognosis is so grave that resection is very reluctantly resorted to. There are, however, cases in which the iodoform emulsion injection can be of no use; these are the cases in which extensive, primary osteo-tuberculosis has led to the formation of large tuberculous sequestra. In this class of cases the fate of the patient depends upon operation at the earliest possible moment when the diagnosis can be made. Not only does the tuberculous osteomyelitis extend into and destroy large territories of bone, or perforate through the acetabulum into the pelvis, but there is also greater liability to general tuberculosis in this severe class of cases.

In the early stage, exact diagnosis is generally impossible because both the light and the severe cases frequently commence alike, and it is not until later in the course of the disease when it is seen that, in spite of ordinary treatment, the severity of the symptoms persists or is aggravated, that extensive osteo-tuberculosis can be suspected, to be verified, however, only by ocular demonstration during the operation.

It is in this connection that he desired to call attention to a symptom—namely, the click of polished bone surfaces—which enabled him to make a positive diagnosis in the following case:

Case.—P. M., aged twenty-five years, entered Emergency Hospital January 19, 1893. Upon examination the right leg was seen to be slightly adducted and flexed, and exceedingly painful when moved. The patient holds it absolutely at rest with the other leg or hand. The right leg in corrected position shows one inch and a half shortening. On the outer anterior side of the femur in its upper third is a swelling extending from the anterior inferior spine of the ilium downward six inches to the second third of the femur. Rectal examination negative.

Diagnosis.—Tuberculosis of hip with abscess on outer aspect of femur.

Plan of Operation.—Evacuation of abscess and iodoform emulsion injection.

While the patient was being anæsthetized with ether the usual nervous tremor occurred, and a sound could now be heard all around the operating-table resembling the chattering of teeth, or the noise made by sliding a stick along the palings of a fence, or a cane in the spokes of a wheel in motion, or a woodpecker in a tree, as those surrounding the table variously described it. When the femur was moved with the hand a similar crepitation was heard, as when two eburnated surfaces are pushed together, a sound like the click of billiard balls.

This sound was suggestive of the presence of large, eburnated, polished, opposing bone surfaces, which signified large, embolic, polished sequestra both of the head of the femur and of the acetabulum.

The plan of aspiration and iodoform emulsion could not be carried out, as the pus was so thick and contained so many solid lumps that it obstructed even a large trocar. Incision of the abscess on the anterior upper and outer aspect of the femur was then made, and three or four ounces of pus mixed with solid shreds evacuated.

The abscess was scraped and found to contain large necrotic pieces of yellowish tissue as in diffused phlegmon. This signified destructive soft tuberculosis,—tuberculous diffused phlegmon. Two ounces of iodoform emulsion were injected through a canula inserted above the trochanter and the fluid came out through the abscess.

The wound over the abscess was hermetically sealed, and after the abscess cavity was thoroughly cleansed with tincture of iodine two ounces of the iodoform emulsion was injected.

Excision of the hip was postponed until the permission of the patient should have been obtained.

On January 26, the patient was again anæsthetized with ether, and Kocher's incision made. The margins of the wound were separated and the sciatic nerve pulled backward. When the capsule was opened, a mass of soft tuberculous granulation tissue or *débris* came out. Some difficulty was experienced in loosening the head and neck preparatory to the dislocation of the head of the femur. Upon exploration with the finger before dislocating the head, he felt a bone surface which he at first thought to be a fracture of the neck of the femur, the head being loose, but it proved to be sequestra in the acetabulum.

When the head of the femur was dislodged from the acetabulum, it was seen that the groove for the ligamentum teres was filled with tuberculous granulation tissue. Half an inch from the fossa, two white polished surfaces were seen, which were the bases of two sequestra, one of which was wedge-shaped, not loosened, but surrounded by a reddish area of bone in a state of granulation, which signified tuberculous osteomyelitis. The head was sawed through at about the epiphyseal line.

The acetabulum was almost entirely occupied by seven sequestra with polished surfaces, limited or surrounded by areas of red tuberculous granulation tissue. These were easily lifted out with a sharp spoon, only one of the sequestra being slightly adherent.

The wall of the acetabulum was now bony over its entire surface with no perforation into the pelvis. After curetting, a rather hard, firm, bone surface remained; at the upper posterior border there was a cavity half an inch in diameter and quarter of an inch deep which contained no sequestra, but was filled with soft or sandy cheesy matter, containing gravel of bone.

The capsule was excised with the knife and scissors, the bone surface cauterized with the Paquelin cautery, and tincture of iodine applied. The abscess wound was reopened, the cavity scraped and cleansed with tincture of iodine. The abscess wound was now packed with iodoform gauze and deep and superficial sutures inserted and provisionally tied. A plaster cast was then applied.

The patient died from general tuberculosis five months later.

Dr. Fenger met with a similar case of tuberculosis of the hip several months later in Mercy Hospital. Professor W. E. Morgan, to whom he had related his experience, in passing through one of the wards of the hospital, heard a similar clicking or chattering sound, and upon examination found that the patient from whom these sounds proceeded presented the same phenomena upon manipulation of the hip as were observed in the first case. The click could be heard all over the ward. Professor Morgan thereupon made his diagnosis, which was verified by the excision.

It is, of course, necessary that there be polished bone surfaces on both sides of the joint, and opposite to each other, in order to elicit this symptom; if, consequently, there is a large sequestrum on one side of the joint only the symptom is absent.